Editorials

Cirrhosis, Alcohol, and the Heart

ELSEWHERE IN THIS JOURNAL, Lee has presented an excellent comprehensive summary of the cardiac and circulatory abnormalities often seen accompanying liver cirrhosis. For the most part, these reflect damage to the heart and liver from chronic alcohol abuse, although nonalcoholic cirrhosis can produce subtle changes in cardiac performance as well.

Clinically a patient with alcoholic cirrhosis, particularly in a decompensated state, frequently shows signs suggesting a hyperkinetic circulation. Among these are an obvious increase in the oxygen saturation of antecubital vein blood compared with that seen in the usual patient, with palmar erythema, warm hands, the occasional presence of clubbed fingers, and bounding peripheral pulses. Repeated studies, as noted in Lee's review, have documented the presence of a high cardiac output in these patients that is unrelated to thiamine deficiency, anemia, or an increase in the circulating blood volume. The arterial blood pressure is usually normal or even low, indicating that systemic vascular resistance is reduced. A number of theories have been proposed to account for the generalized systemic vasodilation that is observed, but the exact mechanism remains a matter of speculation.

This chronic decrease in afterload appears to outweigh the frequent presence of some degree of depressed myocardial contractility in patients suffering from alcoholic cirrhosis. As a result, there occurs the paradox of a patient with impaired myocardial function having an increased stroke output. It is of interest that some of these patients when studied serially over days to months while hepatic compensation was being restored, and after prolonged abstinence from alcohol, show a return of their cardiac output to the normal range.[1]

Clinicians at times assume that high-output heart failure occurs in decompensated cirrhosis not only because a hyperkinetic circulatory state is evident, but also because marked peripheral edema, ascites, and pleural effusions are present. Heart failure may be erroneously assumed because the central venous pressure is elevated and, therefore, there appears to be an increase in the right ventricular filling pressure. The rise in central venous pressure, however, is inevitably modest and primarily reflects transmission of the increase in mean intrapleural pressure resulting from tense ascites with a resultant elevation of the diaphragm. This can be readily demonstrated by the immediate fall in right atrial and central venous pressures that will occur with abdominal paracentesis sufficient to lower significantly the intra-abdominal pressure.[1] Furthermore, these patients do not have gross cardiomegaly, S_3 gallops, pulsus alternans, or other findings suggesting cardiac failure. This view is further supported by an echocardiographic examination, which usually reveals a normal or minimally increased left ventricular volume and a normal global ejection fraction.

In his review, Lee has suggested that tense ascites, which increases the intrathoracic and intrapleural pressures, decreases the cardiac transmural filling pressure. However, the modest increase in right atrial and central venous pressures, seen when a catheter is placed in these sites in a cirrhotic patient with tense ascites, suggests that the increase in the intravascularly measured pressure is reflecting an approximately corresponding increment in intrathoracic pressure. I am unaware of any direct measurement of transmural filling pressure in patients with cirrhosis; it would require the simultaneous measurement of end-diastolic ventricular pressure and intrapericardial pressure at the same hydrostatic level. The immediate rise in cardiac output after paracentesis is not in itself evidence of improved myocardial contractility. Instead, it may reflect improved venous return to the heart following a reduction of the intra-abdominal pressure. This might be associated with an actual increase in the transmural filling pressure despite the fall in measured venous or right atrial pressure if the intrapleural (and, therefore, intrapericardial) pressure actually falls more. Furthermore, the increase in cardiac output may result from a fall in the afterload as well, reflecting a drop in the intra-abdominal pressure. In any case, it is hard to make a strong argument for the view that tense ascites per se directly impairs cardiac performance.

It is intriguing that alcoholic cardiomyopathy with classic overt low-output congestive heart failure is seldom seen in patients with cirrhosis. Lee has pointed out two principal explanations for this observation, namely the masking of overt failure by a chronic unloading of the left ventricle because of the low peripheral resistance and the statistical fact that two diseases, each of which may result in premature death, will correlate negatively at autopsy. There is, however, a third possible explanation that deserves comment. Alcoholic dilated congestive cardiomyopathy generally develops after many years of heavy alcohol consumption regardless of the presence of an otherwise good nutritional status. Presumably, however, good overall nutrition is protective to the liver, preventing or at least delaying the development of cirrhosis. In other words, patients with chronic, severe alcoholism will eventually have either alcoholic cirrhosis or alcoholic cardiomyopathy, largely depending on their dietary habits. But even those in whom cirrhosis develops will usually exhibit impaired ventricular performance, that is, a latent or preclinical cardiomyopathy that can be shown when the heart is stressed with exercise or with pressors such as an angiotensin infusion. This is a reflection of myocardial damage resulting from chronic alcohol abuse, however, and is not due to cirrhosis per se.

The relationship between cirrhosis, alcohol consumption, and coronary atherosclerosis remains an enigma. Lee in his review points out that most autopsy studies reveal a lower prevalence of coronary atherosclerosis and myocardial infarction among cirrhotic patients than in controls. This is in agreement with our observations at San Francisco General Hospital where postmortem examinations on 105 patients with cirrhosis compared with 105 age- and sex-matched controls showed a lesser incidence and severity of coronary atherosclerosis.[1] It should be noted, however, that many of these autopsy studies have been criticized on the basis that the respective control groups had an excess of patients with hypertensive and atherosclerotic heart disease and were not truly representative of the populations to which the cirrhotic patients belonged.[2]

Many explanations have been put forth regarding the apparent negative association between cirrhosis and coronary atherosclerosis. These include the statistical bias of studying at necropsy two potentially lethal diseases; the lowered blood pressure, increased fibrinolytic activity, and the hyperestrogenism found in cirrhotic patients; and the ability of alcohol consumption to increase high-density-lipoprotein (HDL) cholesterol levels significantly. The last is frequently cited to explain the many epidemiologic observations that show that moderate alcohol consumption itself, regardless of the presence or absence of cirrhosis, appears to be associated with a reduced mortality from coronary heart disease. That moderate alcohol consumption is protective against the development of coronary atherosclerosis is particularly intriguing in light of the known association between alcohol consumption and hypertension,[3] a known risk factor for coronary heart disease.

The protective effect of HDL cholesterol in the prevention of coronary heart disease appears to reside in a specific association with the HDL_2 subfraction.[4] Alcohol consumption, however, appears to preferentially affect the unprotective HDL_3 subfraction.[5] Further confounding this issue is the observation that the curve relating coronary heart disease mortality and alcohol use appears to be U-shaped. That is, there is substantial evidence to suggest that habitually heavy alcohol intake, in contrast to so-called moderate intake, actually results in an excess of coronary heart disease deaths.[6] The validity of this observation is supported by data showing an increase in the rate of nonfatal coronary heart disease as well in those who have a heavy alcohol consumption.[7]

It hardly makes sense today in light of the lack of understanding of the mechanisms by which moderate alcohol consumption may protect against atherogenesis to recommend its use for this purpose. Aside from the social issue of advocating the consumption of moderate amounts of a substance known to lead frequently to serious abuse, the relative risk reduction for coronary heart disease can be achieved more readily and appropriately by attention to directly eliminating the more serious risk factors such as cigarette smoking, hypertension, hypercholesterolemia, and obesity.

Alcohol abuse is the most common among the known causes of cardiomyopathy. Coronary heart disease is the leading cause of death in the industrialized world. Yet, it is clear from the above discussion that many questions remain unanswered concerning the mechanisms and association between alcohol consumption, cirrhosis, and both nonischemic and ischemic heart disease. What emerges is that despite a great number of studies in recent years involving alcohol both in animals and in humans, much further research is needed. In the interim, the one therapeutic recommendation that is readily apparent is that abstinence from alcohol is crucial to patients not only with overt cirrhosis or alcoholic cardiomyopathy, but to those who habitually ingest large amounts of alcohol even in the absence of clinical heart or liver disease.

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Perioperative Glucose Control in Diabetic Patients—Strategies for the 1990s

PERIOPERATIVE CONTROL of plasma glucose levels in diabetic patients is often a challenge. A number of factors combine to make management difficult. When patients are admitted for surgery, the physicians who will be managing their diabetes in the hospital may not have all the desirable information about the patients' treatment programs, recent levels of glucose control, existing complications, or comorbid conditions. The stress of a surgical procedure, postoperative pain, and inactivity usually causes a temporary increase in insulin requirements. Food intake is prohibited or unpredictable. Glucose is given intravenously at varying rates with maintenance fluids or medications. Even a diabetic patient on intensive management who has achieved normal or near-normal plasma glucose levels as an outpatient usually requires close attention and modification of treatment to deal with changing insulin requirements in the postoperative period.

Elsewhere in this issue, Gavin makes several important points that deserve clarification and emphasis. I will focus on two points that should have the greatest impact on the management of diabetes in patients having an operation in the 1990s: bedside blood glucose monitoring and intravenous insulin administration.

The desired range of metabolic control for preoperative diabetic patients is like a target with three rings. The outer ring of the target is the avoidance of both serious hypoglycemia and diabetic ketoacidosis. This can be accomplished in a variety of ways with little effort, keeping the plasma glucose level between approximately 2.8 and 22.2 mmol per liter (50 and 400 mg per dl). The second ring of the target is the broad range of plasma glucose—approximately 3.9 to 12.2 mmol per liter (70 to 220 mg per dl)—that is not associated with obvious signs or symptoms. To achieve this level of control requires a bit of effort but should be attainable in most patients and in most hospital settings. The bull's-eye of this target is normal or near-normal glucose levels—4.4 to 8.3 mmol per liter (80 to 150 mg per dl)—that may enhance wound healing and reduce the risk of infection by optimizing leukocyte function.

A major problem in convincing clinicians that meticulous control of plasma glucose levels is important for diabetic patients after an operation is that, other than missing the target altogether, neither clinicians nor patients are likely to ever appreciate the results of good control. Patients with poor glucose control often recover from an operation without obvious adverse effects. Patients with good glucose control (or even nondiabetics) may have poor wound healing or postoperative infection unrelated to their plasma glucose levels. Because there are so many variables, there will probably never be a definitive study that clearly shows the benefits of good glucose control for a diabetic patient after surgical treatment. There is sufficient circumstantial evidence, however, to warrant a goal of normal or near-normal glucose